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A letter from Charles Rau, New York, was read, requesting information respecting one of the Society's publications.

A letter from G. W. Israel, dated Philadelphia, December 5, 1862, was read, respecting certain alleged geometrical discoveries, and requesting a committee.

Donations for the library were received from the L. and P. Society of Manchester, the Essex Institute, the B. N. H. Society, the Editors of the Am. Jour. of Science, the Superintendent of the Census of 1860, and Admiral Dupont.

The committee to which was referred the paper of Mr. Chase on "Intellectual Symbolism," reported in favor of its publication in the Transactions; and gave a critical review of its scope and character. On motion of Mr. Fraley it was so ordered to be published.

The Treasurer read his annual report, which was referred to the Finance Committee.

The Publication Committee presented their annual report. Pending nominations Nos. 465 to 477 were read.

And the Society was adjourned.

Stated Meeting, December 19, 1862.

Present, twenty-one members.

Professor CRESSON, Vice-President, in the Chair.

A letter accepting membership was received from Dr. F. T. Frerichs, dated Berlin, November 21st, 1862.

Letters acknowledging the receipt of publications were received from the Society of Antiquarians of London, November 28th, and the Corporation of Harvard College, December 8th, 1862.

Letters respecting donations were received from Dr. Jarvis, Dorchester, Mass., December 12th, and Dr. George Smith, Upper Darby, December 9th, 1862.

Donations for the Library were received from the Royal Astronomical Society, the American Antiquarian Society,

Franklin Institute, Messrs. Isaac and M. C. Lea, Mr. R. Vaux, and Dr. Smith.

The death of Ellwood Morris, a member of this Society, was announced as having taken place in November last in North Carolina, while in the service of the Confederate States.

Dr. Emerson exhibited specimens of syrup and sugar manufactured from the Sorghum cane, and described the process by which the sugar was allowed to separate itself and crystallize spontaneously.

The culture, he said, of the *Sorghum Saccharatum* in our Middle, Northern, and Western States, has spread with marvellous rapidity, and in seven years, added millions of dollars to our agricultural resources. The amount for 1862 cannot be less than six millions of dollars for the saccharine products alone. From what has been already accomplished, and the further expansion sure to follow, we are authorized to regard the introduction of the Chinese sugar-cane of the Northern provinces, the richest acquisition to our agricultural resources since that of cotton. It bids fair to secure us very soon from the tropical monopoly which has so long existed for the supply of sugar. The short history of its introduction into Europe and America is highly interesting.

In 1851, some seeds of various Chinese plants were sent from Shanghai to the Geographical Society of Paris by the Count de Montigny, the French Minister to China. These were distributed by the Paris Geographical Society to different parts of France. Some went to Toulon, where they were planted in the Marine Gardens, under the direction of M. Robert. With all his care, he only succeeded in getting one seed of the sugar-cane to germinate, and was so fortunate as to guard the single offspring, and bring it to maturity. This was in 1852. Some of the seed of the solitary plant fell into the hands of a skilful gardener at Hyères, who gathered his little crop in 1853. Eight hundred of these seed were purchased by Vilmorin, Andrieux & Co., seed merchants at Paris, who paid for them no less than eight hundred francs! M. Vilmorin planted his seed in 1854, and obtained a rich return. In the progress of their growth, he made experiments with the plants in different stages, and at the close of the year 1854, published his "Researches upon the *Sorgo Sucré*." In November, 1854, Mr. D. Jay Browne, of the United States Patent Office, returned from Europe to America, bringing

some of the seed of this Chinese sugar-cane, procured from M. Vil-morin. These were distributed throughout our country, and have been the means of bestowing upon it the rich returns we are now enjoying.

Though so valuable as a sugar-producing plant in Northern climates, its value does not stop here. In its green state, it yields the greatest amount of rich, succulent forage to the acre of any other plant, being eminently adapted to resist droughts. Previous to sugar-making, a large amount of fodder is stripped from its tall stalks, and cured for winter forage. The seed, which are abundant, are excellent for feeding to poultry and farm stock, and even for making into bread. From the hull of the seed, a rich purple with other tints have been extracted, formerly unknown in Europe. For feeding purposes, the seed products are fully equal to an oat crop from the same measure of ground. As an alcoholic producer, nothing else can compare with it, and this now appears to be the chief purpose to which it is consigned in Southern Europe and Algeria, where it is extensively cultivated. The spirit yielded by the first distillation is fully equal, if not superior to what can be obtained by double distillation from the grape, which for this purpose it has almost superseded. The necessity of the cereals to be used as bread, led to a prohibition of their distillation, but their place has been unexpectedly supplied by a far better alcoholic material. In the United States, the sugar products have been mainly sought after, and common farmers are now turning out the richest of syrups in millions of gallons, twelve pounds to the gallon, each capable of furnishing seven and a half pounds of crystallized sugar. But little capital or skill is required, and the common farm mills to press the canes, and newly invented evaporators to reduce the fresh juice to syrup, cost comparatively little. The whole apparatus to make one hundred to one hundred and fifty gallons of syrup a day, can be obtained for about the price the farmer pays for a good grain thresher, say \$200 to \$250. The improved evaporators reduce the fresh juice to thick syrup in the almost incredible short time of twenty to thirty minutes, and at an expense of less than fifteen cents per gallon. The bagasse, or residue of pressed cane, after being dried, is made into bales, and finds a ready market at the paper mills.

Though the richest land will produce the largest canes, the saccharine product is not always in proportion to the weight of the cane. Vegetable mucilage with nitrogenous matters often take the place of sugar. Hence, soils of moderate fertility will often yield more sugar

to the acre than much richer land. I have known land which would not yield over twenty bushels of Indian corn per acre, give one hundred gallons of the richest sorghum syrup; as much as has been produced in some other places from land yielding fifty and sixty bushels of corn per acre. Although I have stated the produce of the sorghum at some one hundred to one hundred and fifty gallons per acre, this is but a moderate estimate. Mr. Lovering obtained at the rate of sixteen hundred and twelve pounds of sugar, and eighty-two gallons of molasses per acre, and states that he had heard of an instance where the product near Philadelphia was at the rate of four thousand four hundred and ninety-nine pounds of sugar, and two hundred and seventy-four gallons of molasses to the acre! He gives the strongest reasons to believe, that the saccharine yield per acre of the Chinese sorghum in the Middle States, will be fully equal to that from the tropical cane in Louisiana.

In Europe, where they have been so extensively engaged in manufacturing sugar from the beet, this root has been found to furnish the largest proportion of crystallizable sugar in the Northern provinces, where the great manufactories now chiefly exist. Reversing this order, the Chinese sorghum yields its greatest amount of crystallizable sugar in the Southern provinces.

As yet no regular plan has been adopted in this country to separate the sugar of the sorghum syrup from its glucose, and some expert chemists have been signally foiled in their efforts, and even gone so far as to pronounce it impracticable. Others have succeeded much better. Among these, I will name Mr. J. S. Lovering of this city, an extensive sugar refiner, who has most satisfactorily demonstrated the practicability of obtaining from sorghum raised near Philadelphia, all the grades of sugar, from the lowest quality of Muscavado to the best loaf. No fears need be entertained that this object will not soon be attained through easy methods. Meantime there seems to be a strong tendency in syrups well manufactured from mature cane, to deposit, under certain favorable circumstances, granulated sugar spontaneously. Instances of this kind have come under my notice, where considerable quantities of granulated sugar were obtained without any artificial process. The field is fairly open to experiment, and rich rewards may soon be confidently expected. The similarity existing between the climates of the United States and China, leads us naturally to anticipate superior advantages from the culture in our country of the sugar-cane of the Northern provinces of China.

Professor Trego gave his own observations of the culture of Sorghum in Berks County, Pa.

Professor Cresson remarked upon its disposition to hybridize with broom-corn, and other varieties, and its consequent deterioration.

Judge Hare made a verbal communication upon the probable tendencies of the modern theories of the metamorphoses of force.

Mr. Cornelius exhibited specimens of unannealed glass, and illustrated its brittleness.

Professor Coppée exhibited specimens of rifle, musket, mortar, and cannon powder, and described the perforated Rodman powder for fifteen-inch columbiads. Mr. Tilghman explained the difficulties once encountered, in producing a powder so well mixed as to explode rapidly, and how the opposite quality is now a desideratum.

Mr. Peale read the following extracts from a letter from Mons. A. Morlot, of Lausanne, dated November 6th, 1862.

“There is certainly some similarity between the European and the American stone age. Where the elements were so simple, great dissimilarity could not have prevailed. But some dissimilarity does evidently exist; and what strikes me most in comparing the collections, is to see the superiority betrayed by the European remains. With certain analogies with savage life, there are here decided tokens of civilization. Then also it would appear as if the arts of peace predominated with us, whilst your numerous tomahawks, entirely wanting here, attest of more ferocious dispositions. But these are only ideas, to which I do not attach any value. Much more study and research is necessary, to see a little clearer into the matter. We know as yet fearfully little.

“You have looked out chiefly for stone. Field study will be sure to lead to the discovery of the sites of ancient dwellings, where plenty of other remains than stone or pottery will be found. *One* good spot, carefully examined, can teach a great deal.

“The Americans will have great trouble in establishing a stone age anterior to the copper age, and in distinguishing it from the stone age posterior to the copper age. And yet this distinction must be made, if a satisfactory idea of the past is to be arrived at. You will

have to look out chiefly for good examples of *superposition*. It is a chance to find them, but then such chances will befall those who seek. I have had special good luck with the Tiniere,* but then how often have I examined railway cuttings in vain! The chance consisted more in finding the thing at a short hour's walk from Montreux, where I often stay, so that I could visit and revisit the spot very easily. The bones from the stone age stratum have been re-examined by Professor Rustimeyer. From what he says, I am led to think that they indicate the end of the stone age, or the beginning of the bronze age. This would be very important, for then we should thus get at an evaluation of the duration of the bronze age, since the tweezers found in the bronze age stratum, at a depth of ten feet, belong to the end of the bronze age. Hitherto we were left without the faintest idea how long the bronze period might have lasted.

"It would be of the greatest interest, to make a careful investigation of the ancient copper diggings on Lake Superior, before the modern works have blotted them all out.

"Men living in a continent so cut up by Mediterranean Seas as Europe, can hardly form a good idea of the past of America, in as far as commercial intercourse is concerned. Our antiquarians do not even seem aware of the extreme advantage the features of our continent must have lent to commerce in ancient times. I have alluded to this at the end of the Chapter, Ancient Civilization of the North (Smithsonian Report).

"Pretty good samples of *fishing nets* have been found in the stone age establishment of Robenhausen (Canton of Zürich), together with well-preserved bows (for shooting), made of the yew (*Taxus buccata*). Dig and dredge, and you will find!"

Dr. Le Conte denied the existence of evidences of a genuine copper or bronze age in America, the equivalent of the so-called copper or bronze age in Europe. The relics of copper found in the mounds are neither fused nor alloyed, but simply hammered, and belong, therefore, properly to the class of stone implements, native argentiferous copper being acci-

* The Cone of the Tiniere is a torrential dejection at the point where that stream enters Lake Lemman at Villeneuve, and which was cut transversely by a railway excavation.

dentially one of the minerals at the command of the savages who built the mounds.

Dr. Roehrig presented a photographic likeness of Mirza Alexander Kasem Beg, a lately elected member of the Society, and the Librarian was requested to continue the collection of *cartes de visite* of the members.

The Finance Committee made their annual report, recommending two resolutions, which on motion were adopted, viz., the payment of the bill of C. Sherman & Son, for printing Vol. XII, Part II, of the Transactions, and the following appropriations for the ensuing year :

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| For Journals, | \$50 |
| Hall, | 100 |
| Binding, | 100 |
| Publications, in addition to the interest on the Publication Fund, | 800 |
| General account, salary of Librarian, | 700 |
| Salary of Janitor, | 100 |
| Insurance of Library and Cabinet in Hall, and paper at Sherman's, | 165 |
| Assistant Librarian, | 360 |
| Petty expenses of Librarian, | 50 |
| Commissions to Treasurer, &c. &c., | 600 |
| Total appropriations, | <u>\$3025</u> |

Pending nominations Nos. 465 to 477, and new nominations Nos. 478, 479 were read.

The Senior Secretary made a verbal report that the Secretaries recommend the deposit of Mr. Breck's MS. in the Library among the MSS. of the Society.

And the Society was adjourned.